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(54) **CONNECTING A PHONE CALL TO A
MOBILE TELECOMMUNICATION DEVICE
BASED ON THE TIME OF DAY THAT THE
COMMUNICATION IS INITIATED**

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379/445

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379/132, 357, 211, 444; 455/406, 445, 408,
455/409; 235/380; 704/E17
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,105,131	A *	8/2000	Carroll	713/155
6,205,553	B1 *	3/2001	Stoffel et al.	726/7
7,164,759	B2	1/2007	Lebowitz et al.	
7,194,070	B2	3/2007	Starbuck et al.	
7,236,577	B2	6/2007	Lecton et al.	
7,411,939	B1 *	8/2008	Lamb et al.	370/352
2001/0002364	A1	5/2001	Lahtinen	
2003/0112948	A1	6/2003	Brown et al.	

2004/0001501	A1 *	1/2004	Delveaux et al.	370/442
2004/0001579	A1 *	1/2004	Feinberg et al.	379/156
2005/0060584	A1 *	3/2005	Ginter et al.	713/201
2005/0097222	A1	5/2005	Jiang et al.	
2005/0163104	A1	7/2005	Christensen et al.	
2006/0140200	A1 *	6/2006	Black et al.	370/401
2006/0210032	A1	9/2006	Grech et al.	
2007/0037561	A1	2/2007	Bowen et al.	
2007/0118892	A1 *	5/2007	Sastry et al.	726/10
2007/0133776	A1	6/2007	Jain et al.	
2007/0276911	A1 *	11/2007	Bhumkar et al.	709/206
2007/0286384	A1	12/2007	Christensen et al.	
2009/0141875	A1 *	6/2009	Demmitt et al.	379/88.14
2009/0151007	A1 *	6/2009	Koster et al.	726/30

OTHER PUBLICATIONS

R. Karunamuthy et al. "A Business Model for Dynamic Composition of Telecommunication Web Services" IEEE Communications Magazine, Jul. 2007, pp. 36-43.

* cited by examiner

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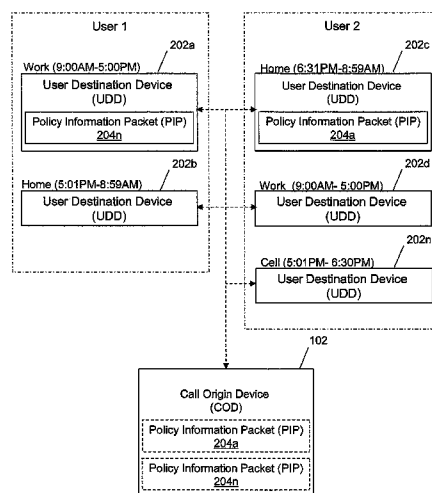
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(57) **ABSTRACT**

A method, system, and computer-readable medium with executable code for connecting an outgoing phone call to a user destination device based on the time the phone call is initiated. A user of a user destination device transmits a policy information packet containing contact numbers of a primary user destination device and all secondary user destination devices that the user may be reached at during specific times of the day to a call originating device. In response to the user of a call originating device initiating a request to connect a phone call to the user destination device, the call originating device autonomously selects the correct recipient user destination device by interpreting the policy information packet. The call originating device then connects the phone call to the primary user destination device or to a secondary user destination device depending on the current time of day.

9 Claims, 3 Drawing Sheets



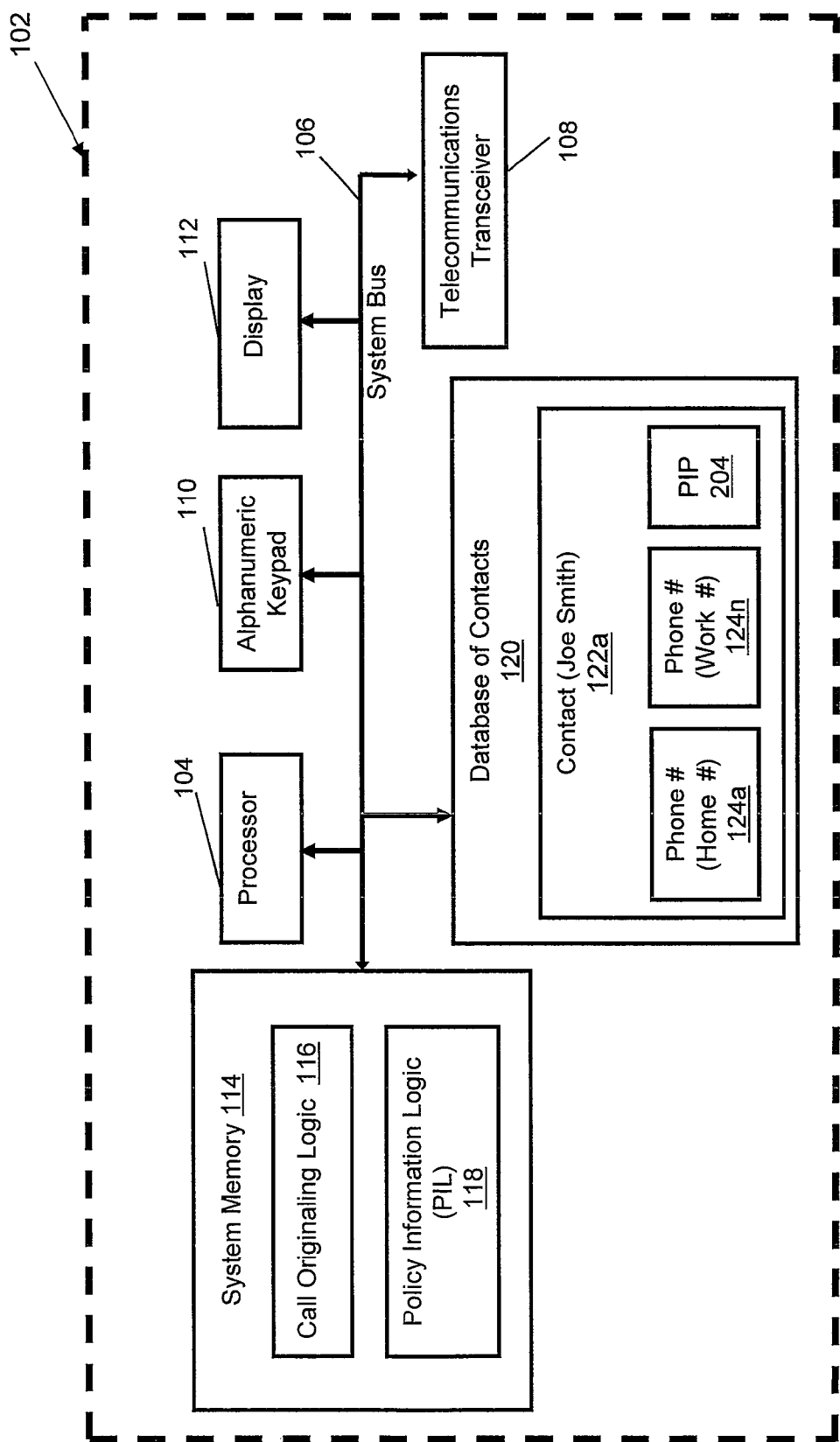


FIG. 1

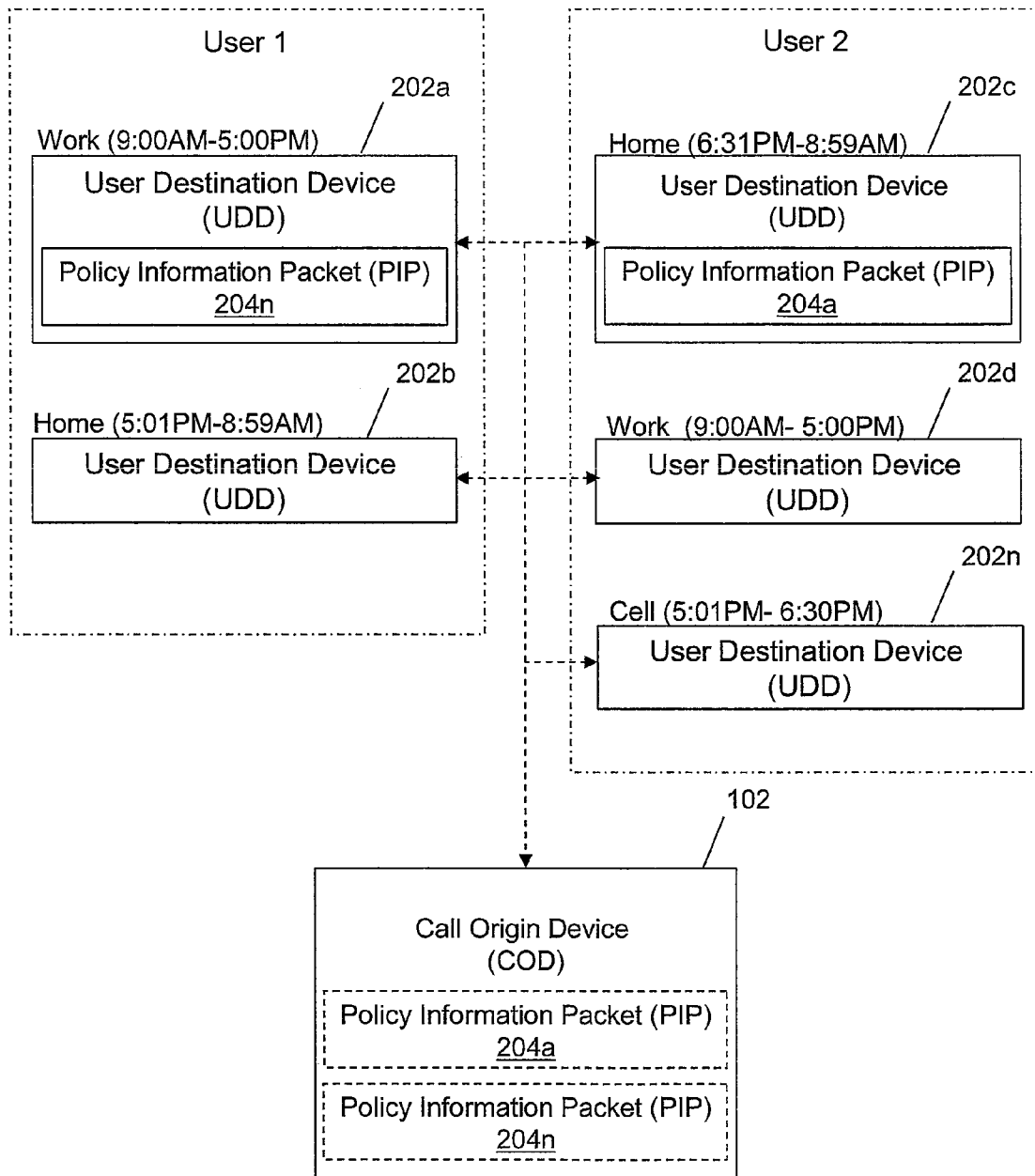
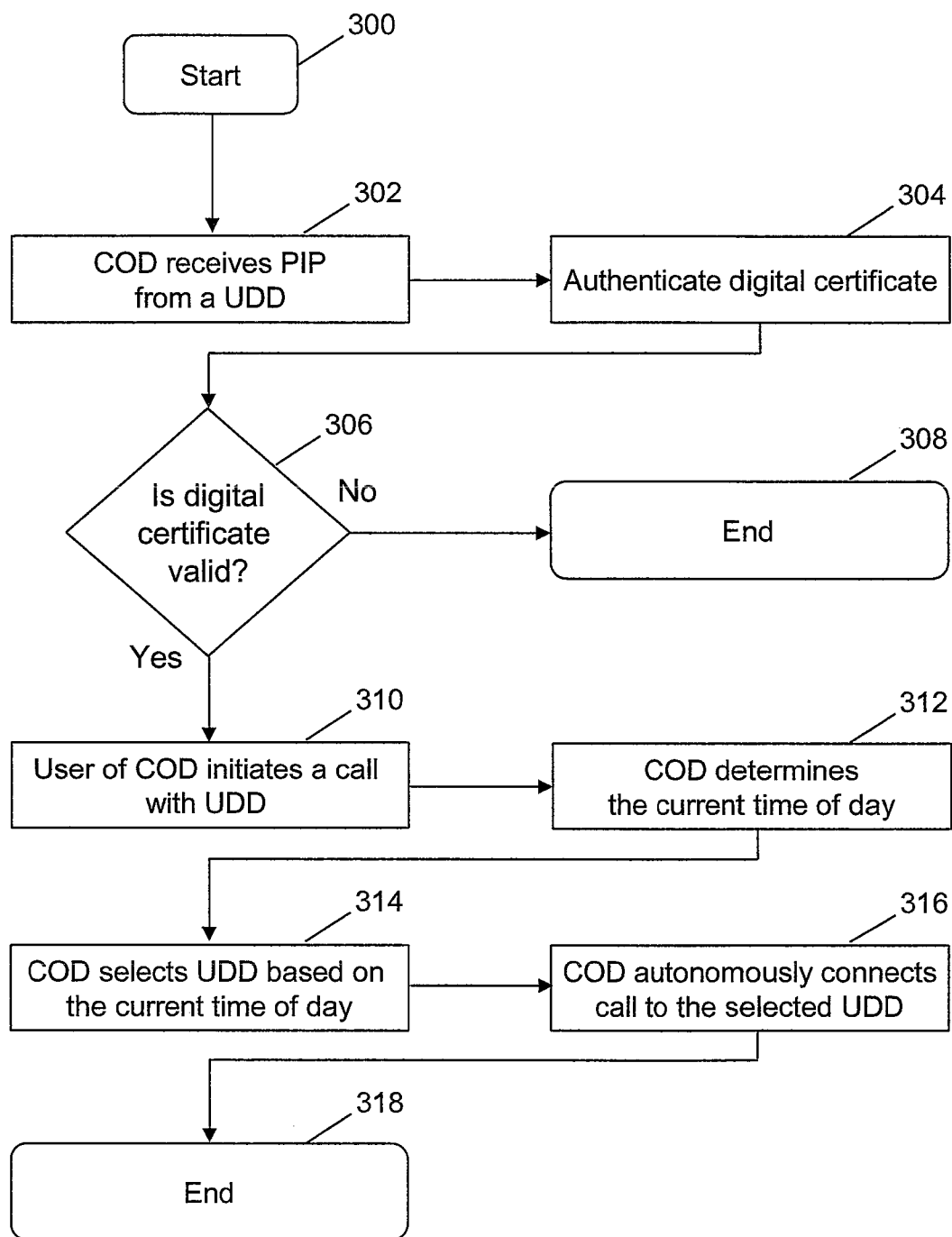


FIG. 2

**FIG. 3**

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CONNECTING A PHONE CALL TO A MOBILE TELECOMMUNICATION DEVICE BASED ON THE TIME OF DAY THAT THE COMMUNICATION IS INITIATED

BACKGROUND OF THE INVENTION

1. Technical Field

The present invention relates in general to telecommuni-
cations, and in particular to mobile telecommunication
devices. Still more particularly, the present invention relates
to connecting a phone call to a host telecommunication device
based on the time of day that the communication is initiated.

2. Description of the Related Art

Mobile telecommunication devices, such as cellular (cell)
phones, have become a ubiquitous aid in allowing a person to
be constantly accessible. While most cell phone users appre-
ciate the convenience of being able to originate a communi-
cation (e.g., a phone call) at any time, there are times when a
user of a mobile telecommunication device may not desire, or
be available, to take an incoming call at a primary telecom-
munication device (e.g. the user has left the office for the day).

SUMMARY OF THE INVENTION

A method, system, and computer-readable medium with
executable code for connecting an outgoing phone call to a
user destination device based on the time the phone call is
initiated. A user of a user destination device transmits a policy
information packet containing contact numbers of a primary
user destination device and all secondary user destination
devices that the user may be reached at during specific times
of the day to a call originating device. In response to the user
of a call originating device initiating a request to connect a
phone call to the user destination device, the call originating
device autonomously selects the correct recipient user desti-
nation device by interpreting the policy information packet.
The call originating device then connects the phone call to the
primary user destination device or to a secondary user desti-
nation device depending on the current time of day.

The above as well as additional objectives, features, and
advantages of the present invention will become apparent in
the following detailed written description.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the invention
are set forth in the appended claims. The invention itself,
however, will best be understood by reference to the follow-
ing detailed descriptions of an illustrative embodiment when
read in conjunction with the accompanying drawings,
wherein:

FIG. 1 is a block diagram of a receiving telecommunication
device in which the present invention may be implemented;

FIG. 2 is a block diagram of an exemplary system for
autonomously selecting a host telecommunication device as
the recipient of a phone call based on the time of day that the
phone call is placed.

FIG. 3 is a high-level logical flowchart of an exemplary
method for autonomously selecting among multiple host tele-
communication devices as the recipient of a phone call based
on the time of day that the phone call is placed.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The illustrative embodiments provide a method, system,
and computer-readable medium with executable code for

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connecting an outgoing phone call to a user destination device
based on the time the phone call is initiated, in accordance
with one embodiment of the invention.

In the following detailed description of exemplary embodi-
ments of the invention, specific exemplary embodiments in
which the invention may be practiced are described in suffi-
cient detail to enable those skilled in the art to practice the
invention, and it is to be understood that other embodiments
may be utilized and that logical, architectural, programmatic,
mechanical, electrical and other changes may be made with-
out departing from the spirit or scope of the present invention.
The following detailed description is, therefore, not to be
taken in a limiting sense, and the scope of the present inven-
tion is defined only by the appended claims.

It is understood that the use of specific component, device
and/or parameter names are for example only and not meant
to imply any limitations on the invention. The invention may
thus be implemented with different nomenclature/terminol-
ogy utilized to describe the components/devices/parameters
herein, without limitation. Each term utilized herein is to be
given its broadest interpretation given the context in which
that term is utilized.

With reference now to FIG. 1, there is depicted a block
diagram of an exemplary Call Origin Device (COD) 102 in
which the present invention may be implemented. COD 102
includes a processor 104 that is coupled to a system bus 106.
A telecommunications transceiver 108, which uses a wireless
technology to connect to other telecommunication devices, is
also coupled to system bus 106. An alphanumeric keypad 110
is also connected to system bus 106 and permits data entry by
a user of COD 102. Display 112, coupled to system bus 106,
allows for presentation of text and graphics to a user of COD
102.

System memory 114 is connected to system bus 106. Sys-
tem memory 114 contains a call originating logic, which
serves to manually or autonomously allow control of tele-
communications transceiver 108 to permit communication
with other similarly configured telecommunication devices.
System memory 114 of COD 102 also includes a Policy
Information Logic (PIL) 118. PIL 118 includes code for
implementing the processes described in FIG. 2-3. In one
embodiment, COD 102 is able to utilize PIL 118 to modify
entries in database of contacts 120 and control operations of
call originating logic 116, as described in greater detail below
in FIG. 2-3.

Database of contacts 120 includes a list of contact numbers
for contacts known to COD 102. Each contact listing may
contain contact numbers for multiple telecommunication
devices. Additionally, a Policy Information Packet (PIP) 204
may provide specific information pertaining to phone num-
bers that a specific contact of the database of contacts 120
may be reached at during specific times of day. PIP 204 may
interface directly with individual contact 122 listings, and
may also provide additional phone numbers 124a-n for a
contact 122. Each contact 122 of the database of contacts 120
contains one or more phone numbers 124a-n of a contact 122.

The hardware elements depicted in COD 102 are not
intended to be exhaustive, but rather are representative to
highlight components required by the present invention.

Note also the architecture shown in FIG. 1 for COD 102
may be substantially implemented in User Destination
Device (UDD) 202a-n shown below in FIG. 2.

With reference now to FIG. 2, a block diagram is presented
of an exemplary system for autonomously selecting a User
Destination Device (UDD) 202a-n, where n is an integer
greater than 1, as the recipient of a phone call, based on the
time of day that the phone call is initiated. A UDD 202a-n

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(e.g., a cell phone, a Plain Old Telephone System (POTS) land line, a cell-capable Personal Assistant Device (PDA), etc.) transmits a Policy Information Packet (PIP) **204** to a Call Originating Device (COD) **102**. When a person utilizing COD **102** initiates a call request, a logic internal to COD **102** (e.g., PIL **118**) autonomously selects a UDD **202a-n** to

PIP **204a-n** is a data packet transmitted by UDD **202a-n** which contains contact information and contact phone numbers for two or more UDDs **202a-n** of a contact known to COD **102**. PIP **204a-n** may interface with one or more caller contact entries of a database of contacts of COD **102**. PIP **204a-n** may be a Short Message Service (SMS) message, an Extensible Markup Language (XML) packet, etc. This contact information may include phone numbers that the user of UDD **202a-n** may be reached at during specific times of day. PIP **204a-n** may also include personal information of the user of the associated UDDs **202a-n** (e.g., first name, last name, birth date, etc). Alternatively, PIP **204a-n** may be established at a server provider site linked to the account information of the primary UDD **202a-n**, and may be transmitted from the server provider site directly to a COD **102**.

Additionally, PIP **204a-n** may also include a digital certificate. This digital certificate is a secure electronic signature transmitted by UDD **202a-n** as a security measure. The digital certificate serves to prevent malicious spoofing by unverified telecommunication devices. A PIP **204a-n** containing a digital certificate is transmitted by an UDD **202a-n**. When COD **102** receives the PIP **204a-n** the digital certificate is validated by logic internal to COD **102** (e.g., PIL **118**). COD **102** will not transfer communication to a host telecommunication device until the digital certificate received from that UDD **202a-n** has been verified.

For exemplary purposes, UDD **202a** transmits PIP **202a** to COD **102a**. In this example, PIP **202a** provides instructions for COD **102** to connect an outgoing phone call to be directed to a work mobile telecommunication device, UDD **202a**, between 9:00 AM and 5:00 PM, and to a home telecommunication device, UDD **202n**, between 5:01 PM and 8:59 AM. At 7:38 PM the user of COD **102a** initiates a call with UDD **202a**. PIL **118** determines the current time to be 7:38 PM. PIL **118** then checks PIP **202a** to determine the correct call recipient. Following this, COD **102** autonomously connects the call to the UDD **202n**, selected by PIL **118**.

It is important to note that UDD **202a-n** may transmit PIPs **204a-n** to one or more CODs **102**. Furthermore, PIPs **202a-n** transmitted by a same UDD **202** may contain different contact information, and phone numbers that the user of UDD **202** may be reached at during specific times of day. That is, a PIP **204a** transmitted by UDD **202a** to a first COD **102a** (e.g., a co-worker) may contain different call information than a PIP **204a** transmitted to a second COD **102b** (e.g., a family member).

With reference now to FIG. 3, a high-level logical flowchart of an exemplary method for autonomously selecting a User Destination Device (UDD) as the recipient of a phone call based on the time of day that the phone call is placed. After initiator block **300**, Call Originating Device (COD) receives a Policy Information Packet (PIP) from a UDD. The PIP contains a digital certificate of the sending UDD, and phone numbers and a preferred contact time intervals of the sending UDD and one or more alternate UDDs (block **302**). Upon receiving the PIP, COD attempts to authenticate the digital certificate (block **304**). If the digital certificate is not valid (block **306**), the process terminates (block **308**).

When COD determines the digital certificate to be valid (block **306**), COD may autonomously select a recipient UDD for receiving a phone call, when a phone call is initiated by a

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user of COD (block **310**). After a phone call is initiated, COD determines the current time of day by reading a time clock internal to COD (block **312**). Once the current time has been determined, COD selects a UDD from the list of UDDs in the PIP as the recipient of the phone call based on matching the current time with a contact time interval of an UDD listed in the PIP (block **314**). COD then connects the phone call to the selected UDD (block **316**). The process then ends at terminator block **318**.

Although aspects of the present invention have been described with respect to a computer processor and program application/logic, it should be understood that at least some aspects of the present invention may alternatively be implemented as a program product for use with a data storage system or computer system. Programs defining functions of the present invention can be delivered to a data storage system or computer system via a variety of signal-bearing media, which include non-writable storage media (e.g. CD-ROM), writable storage media (e.g. a floppy diskette, hard disk drive, read/write CD-ROM, optical media), and communication media, such as computer and telephone networks including Ethernet. It should be understood, therefore, that such signal-bearing media, when carrying or encoding computer readable instructions that direct method functions of the present invention, represent alternative embodiments of the present invention. Further, it is understood that the present invention may be implemented by a system having means in the form of hardware, software, or a combination of software and hardware as described herein or their equivalent.

Having thus described the invention of the present application in detail and by reference to illustrative embodiments thereof, it will be apparent that modifications and variations are possible without departing from the scope of the invention defined in the appended claims. In addition, many modifications may be made to adapt a particular system, device or component thereof to the teachings of the invention without departing from the essential scope thereof. Therefore, it is intended that the invention not be limited to the particular embodiments disclosed for carrying out this invention, but that the invention will include all embodiments falling within the scope of the appended claims. Moreover, the use of the terms first, second, etc. do not denote any order or importance, but rather the terms first, second, etc. are used to distinguish one element from another.

What is claimed is:

1. A method of autonomously connecting a phone call to a user destination device based on the time of day that the communication is initiated, the method comprising:

receiving a policy information packet transmitted via a telecommunications transceiver of a first host telecommunication device, wherein the policy information packet includes:

a contact phone number of a first user destination device,
a contact phone number of a second user destination device,
a digital certificate,
a preferred contact time interval of the first user destination device, and
a preferred contact time interval of the second user destination device that is different from the preferred contact time interval of the first user destination device;

in response to receiving the digital certificate within the policy information packet, authenticating the digital certificate, wherein authenticating the digital signature comprises: determining that the digital signature is valid; and allowing the call origin device to autono-

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mously select a recipient user destination device from among the first and the second user destination devices only when the digital signature is determined to be valid; in response to authenticating the digital certificate, modify, with the policy information packet, an entry corresponding to the host telecommunication device in a database of contacts within the call origin device, which causes the call origin device to select, based on determination of a current time interval, one of the first user destination device and the second user destination device when a phone call is subsequently initiated by the call origin device to the first host telecommunication device; and in response to initiating a call request with the first host telecommunication device: determining a time at which the call request is initiated; and
 in response to the call origin device initiating the call request with the first host telecommunication device within the preferred contact time interval of the first user destination device, autonomously connecting the call request to the first user destination device.

2. The method of claim 1, further comprising in response to the call origin device initiating the call request with the first host telecommunication device within the preferred contact time interval of the second user destination device, autonomously connecting the call request to the second user destination device.

3. A call origin device comprising:

a processor;
 a memory coupled to the processor;
 a telecommunications transceiver to connect and exchange information with host telecommunication devices; and processing logic that: receives a policy information packet transmitted via a telecommunications transceiver of a first host telecommunication device, wherein the policy information packet includes:
 a contact phone number of a first user destination device,
 a contact phone number of a second user destination device,
 a digital certificate,
 a first preferred contact time interval of the first user destination device, and
 a second preferred contact time interval of the second user destination device, wherein the second preferred contact time interval is different from the first preferred contact time interval;

in response to receiving the digital certificate within the policy information packet, authenticates the digital certificate, wherein the processing logic that authenticates the digital signature comprises logic that: determines that the digital signature is valid; and allows a call origin device (COD) to autonomously select a recipient user destination device from among the first and the second user destination devices only when the digital signature is determined to be valid;

in response to authenticating the digital certificate, modify, with the policy information packet, an entry corresponding to the host telecommunication device in a database of contacts within the call origin device, which causes the call origin device to select, based on determination of a current time interval, one of the first user destination device and the second user destination device when a phone call is subsequently initiated by the call origin device to the first host telecommunication device; initiates a call request with the first host telecommunication device; and

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in response to the call origin device initiating a call request with the first host telecommunication device within the preferred contact time interval of the first user destination device, autonomously connects the call request to the first user destination device.

4. The call origin device of claim 3, the processing logic further comprising logic that, in response to the call origin device initiating a call request with the first host telecommunication device within the preferred contact time interval of the second user destination device, autonomously connects the call request to the second user destination device.

5. A non-transitory computer-readable storage medium having a plurality of instructions embodied therein, wherein the plurality of instructions, when executed by a processing device, allows a machine to:

receive a policy information packet transmitted using a telecommunications transceiver of a first host telecommunication device, wherein the policy information packet includes:

a contact phone number of the first user destination device,
 a contact phone number of a second user destination device,
 a digital certificate,
 a preferred contact time interval of the first user destination device, and
 a preferred contact time interval of the second user destination device that is different from the preferred contact time interval of the first user destination device;

in response to receiving the digital certificate within the policy information packet, authenticate the digital certificate;

in response to authenticating the digital certificate, modify, with the policy information packet, an entry corresponding to the host telecommunication device in a database of contacts within a call origin device (COD), which causes the call origin device to select, based on determination of a current time interval, one of the first user destination device and the second user destination device when a phone call is subsequently initiated by the call origin device to the first host telecommunication device;

initiate a call request with the first host telecommunication device; and

in response to a call origin device initiating a call request with the first user destination device, wherein the call request is initiated within the preferred contact time interval of the first user destination device, autonomously connect the call request to the first user destination device.

6. The non-transitory computer-readable storage medium of claim 5, wherein the plurality of instructions further comprises instructions that in response to the call origin device initiating a call request with the first host telecommunication device within the preferred contact time interval of the second user destination device, cause the machine to autonomously connect the call request to the second user destination device.

7. The non-transitory computer readable storage medium of claim 5, further comprising instructions for:

establishing the policy information packet at a service provider site;
 linking the policy information packet to account information of the primary user destination device; and
 transmitting the policy information packet from the server provider site directly to the call origin device.

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8. The non-transitory computer readable storage medium of claim 5, wherein authenticating the digital signature comprises:

determining that the digital signature is valid; and
 allowing the COD to autonomously select a recipient user destination device from among the first and the second user destination devices only when the digital signature is determined to be valid.

9. The method of claim 1, wherein the receiving the policy information packet transmitted from via a telecommunica-

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tions transceiver of a first host telecommunication device comprises receiving the policy information packet via a service provider site, which establishes the policy information packet at the service provider site, links the policy information packet to account information of the primary user destination device, and transmits the policy information packet from the server provider site directly to the call origin device.

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